



State of Utah  
DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

0003

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September 24, 1999

Cheryl Martinez  
Bureau of Land Management  
Salt Lake Field Office  
2370 South 2300 West  
Salt Lake City, Utah 84119

Re: Plan of Operations, Gary Applegate, Brown Sugar Mine, Tooele County, Utah

Dear Ms. Martinez:

Thank you for forwarding the plan of operations for Gary Applegate's Brown Sugar Mine located in Tooele County, Utah. We received the plan on September 16, 1999. As this mining activity is to quarry "sand" from active sand dunes, we are unable to comment on the plan. The Utah State Legislature exempted sand, gravel and rock aggregate mining operations from our rules. Pursuant to our approved definition for "sand," we have determined that this is a sand operation; and therefore it is exempted from our rules and regulatory jurisdiction.

If you have any questions, please feel free to contact me at 538-5321.

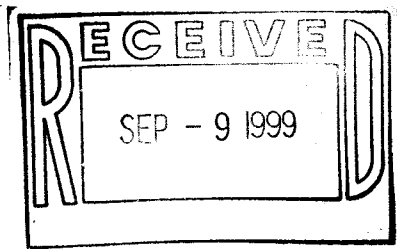
Sincerely,

for Tom Munson  
Senior Reclamation Specialist

jb

cc: Gary Applegate, Operator  
James Rasmussen, North American Exploration  
Applegate.ltr

0003



# Plan of Operations, Brown Sugar Mine, Tooele County, Utah

August 1999

Prepared for  
Gary Applegate  
P.O. Box 668  
Tooele, Utah 84047

by  
James D. Rasmussen  
1519 No. Easthills Drive  
Bountiful, Utah 84010

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## INTRODUCTION

The purpose of this Plan of Operations is to provide the U. S. Department of Interior, Bureau of Land Management, The Tooele County Department of Engineering and other regulatory bodies with information about the planned Brown Sugar Mine needed to exercise their oversight responsibilities. The Brown Sugar Mine will quarry sand from active sand dunes west of the Cedar Mountains in Sections 17 and 20 of Township 4 South, Range 11 West, Tooele County, Utah (UTM Zone 12, 4,482,500m north, 321,260m east.). The mine will use a dozer, dozer trap and conveyor system to move the sand from the dunes to a 0.6 acre loading yard where it will be placed in a surge / loading bin and loaded in trucks for transport to a single market in Salt Lake County. No crushing or sorting of the sand is needed to supply this market. The quarry will be a commercial pit operation as defined by Uniform Zoning Ordinance of Tooele County (Chapter 27), shipping 125,000 to 200,000 short tons of material per year. Plans are to begin operations in October of 1999 and continue in operation for about twenty years.

The sand deposit to be quarried is a large active dune field. The sand was moved to its present location by westerly winds along a series of parallel, longitudinal or seif dunes. The sand had previously been transported across the flat plain to the west as barchen type dunes and deposited in the shelter of hills to the north of the deposit. Once sufficient sand had accumulated, longitudinal dunes were formed on top of the older barchen dunes and the sand was transported to the present location.

### Operator

Mr. Gary Applegate and Mr. Byron (Bud) Christiansen and their families are the owners of placer mining claims controlling the mineral rights of the dune field. Mr. Christiansen will have on-site operational control of the quarry and can be contacted at telephone number 435-884-3755. Mr. Applegate's and Mr. Christiansen's addresses are;

Gary Applegate  
P.O. Box 668  
Tooele, Utah 84074

Byron Christiansen  
P.O. Box 1087  
Tooele, Utah 84074

Please refer any questions pertaining to this plan to;  
James D. Rasmussen  
1519 No. East Hills Drive  
Bountiful, Utah 84010  
801-544-3421

## Access

The project is accessed from the Clive Exit (Exit No. 49) from Interstate Highway 80 in central Tooele County. Access to the project is gained by traveling south of this exit on paved roads leading to the various waste storage and disposal sites of Envirocare of Utah and other operators to the improved gravel road leading southwest to the Wendover Bombing Range. At a distance of approximately 6.7 miles south of Clive, in the SW¼ SE¼ of Section 30, Township 2 South, Range 11 West, a "two track" road follows an existing road leading south, to Gate 8, of the US Army's Dugway Proving Ground. The route is along a right-of-way granted to the Air Force for a fiber optics line. Approximately nine miles along this road the road intersects an east-west aligned road in the SE¼ NE¼ of section 8, Township 4 South, Range 11 West. Here the route leaves the fiber optics right-of-way and proceeds south along another "two track" road, 1.4 miles where a new road will lead southwest to the loading yard (about 800 feet). This route is shown on Figure 1. (All figures are in Appendix A). The road needs to be upgraded from the point the route leaves the Wendover Range access road to the project site. A dozer trail will lead from the loading yard to the dune field. No permanent roads will be constructed within the dune field. Equipment will traverse through previously mined areas of the dune field to the site of current operations.

## Land Status

The operations will be conducted on placer mining claims owned by the families of the principals in the venture. These claims are listed with their appropriate identification numbers in the following table. In addition, Mr. Applegate and Mr. Christiansen have applied for a mineral lease on Section 32, Township 4 South, Range 11 West from the School and Institutional Trust Lands Administration. The claims outside of sections 17 and 20 are held for future development and not considered in this plan of operations.

OWNERS	CLAIM NAMES	UMC NUMBERS	TOOELE COUNTY RECORDER BOOK & PAGE
Marsha Applegate, Gary Applegate, Dayne Applegate, James McBride, Kari McBride, Alesha Applegate, Roland Culver, and Amy Culver	Brown Sugar 1 through 6	366167 through 366172	Book 575, pages 0146 through 0153
Marsha Applegate, Gary Applegate, Dayne Applegate, James McBride, Kari McBride, Alesha Applegate, Roland Culver, and Amy Culver	Brown Sugar 17 through 20	366183 through 366186	Book 575, pages 0164 through 0167

*Plan of Operations, Brown Sugar Mine*

OWNERS	CLAIM NAMES	UMC NUMBERS	TOOELE COUNTY RECORDER BOOK & PAGE
Byron Christiansen, Danny Dickman, Tony Dickman, Clint Christiansen, Christy Christiansen, Amy Palmer, Helen Christiansen, and Cindy White	Brown Sugar 7 through 12	366173 through 366178	Book 575 pages 0154 through 0163
Marsha Applegate, Gary Applegate, Dayne Applegate, James McBride, Kari McBride, Alesha Applegate, Roland Culver, and Amy Culver	Brown Sugar 21 through 24 & 26, 27	Pending	Pending

With the exception of section 16 and 32 the surrounding land is owned by the Federal Government. The area west of Township 4 South Range 11 West is administrated by the US Air Force as the Wendover Bombing Range. The area south of that township is administrated by the US Army as the Dugway Proving Grounds. All other Federal lands are administered by the Department of the Interior, Bureau of Land Management, Salt Lake District. Sections 16, and 32 are owned by the State Of Utah, and administered by the School and Institutional Trust Lands Administration. Figure 2 shows the claim block and surrounding land ownership.

## DESCRIPTION OF PLANNED OPERATION

The objective of this operation is to recover sand from the now active longitudinal type dune field. The sand will be shipped as mined. The sand will be pushed from the dunes by a dozer into a dozer trap feeding a conveyor belt. At the first transfer point of the conveyor, the sand will pass through an inclined, minus ¼ inch, wire cloth, stationary screen to remove vegetable debris included with the sand during dozing. The undersize fraction will continue on the belt to a raised surge / loading bin located at a permanent loading yard to be described below. The vegetable debris and any oversized sand grains will be spread over the dune field after removal of the nearby dunes by the dozer. At a point near the dozer trap but following the screen, a magnetic belt head pulley will be used to remove tramp iron from the sand that may have resulted from spent military munitions.

The dozer trap and conveyor belt supports will be directly on the sand with no concrete footing. The belt supports will rest on steel plates to prevent them from sinking into the sand. Operations will only remove the sand in the longitudinal and similar dunes, down to the top of the older dunes. It is not anticipated that sand will be removed to the base of the underlaying older dunes.

The sand within a 300 foot radius of the initial placement of the dozer trap will be mined first. After this sand is removed, the conveyor belt will be extended to the northern extreme of the dozed area, and the dozer trap relocated to that location. Sand will again be pushed by the dozer into the trap from the undisturbed dune in another 300 foot radius. This process will progress to the north, south and west of the loading yard until an estimated 4,000,000 tons of sand has been quarried. (It is estimated that the operation will continue over a twenty year period.) If an average fifteen foot thickness is removed from the dune surface, an area covering 6 acres will be disturbed annually. If an average of five feet of sand is removed, 18 acres will be disturbed each year. The irregular height of the dune surface and its shifting topography prevent an accurate estimate of the depth of sand to be removed in any single year or location.

The loading yard will cover about 0.6 acres in the SE ¼, SE ¼, of Section 17. The southeast corner of the yard is located 800 feet west and 800 feet north of the SE corner of Section 17. Within the fenced perimeter of the yard, will be a surge / loading bin with truck load out directly beneath the bin, a portable 10' x 20' office trailer, water well, two 2,000 gallon water tanks (surface, fiber glass) with pressure pump(s), 250 kW generator, 1000 gallon diesel fuel storage tank, 15' x 15' dozer and maintenance shed.

Parking will be available for three employee vehicles, two visitor vehicles, a water truck and a motor grader. Figure 3 illustrates the lay out of the loading yard at a scale of 1"=50'. The mine area and the loading yard are illustrated at a 1"=500'

scale on Figure 4. Soil and vegetation types are also noted on Figure 4.

Wildcat Mountain Resources has applied with the State of Utah, Department of Natural Resource, Division of Water Rights for the right to develop up to three annual acre feet of water from a well to be located within the loading yard. They have not yet received approval of that application. If the application is not approved the operation would either buy water from the BLM at their well located in the SE quarter of section 16 or from Envirocare at Clive. The water will be used for dust control when required and for sanitary purposes in the office trailer. All drinking water will be transported to the site from approved sources.

Electricity to operate the conveyor belt, office and shop will be generated on site by a 250 kW generator to be located in the loading yard. As the conveyor belt lengthens, electrical demand may require this unit to be replaced by a larger one. Distribution within the loading yard will be through buried lines. Distribution from the yard to the conveyor motors will be attached to the frame supporting the conveyor belts.

## **Access Road**

It is necessary to upgrade the access road from the improved gravel road leading to the Wendover Range to the loading yard, a distance of 10.6 miles. The road surface will be raised six inches by the application of pit run gravels to be purchase from a community pit. Four inches of "road base" material screened from gravels at the community pit, will then be placed on top of the pit run material to form the final surface. The planned road profile will be similar to that shown in Figure 5. Passing and safety turnouts will be constructed about every three miles along the route by widening the road way to 28 feet for a length of 50 feet. The road surface will be lowered to the elevation of any drainage to allow storm run-off to pass over the road. No changes in the existing road grade will be necessary.

A cattle guard will be placed where the improved gravel roads exits pavement to knock dust and mud from haul trucks. This is to control fugitive dust.

## **Construction**

Construction will begin with the grading of the access route using an available motor grader from that point where the fiber optics right-of-way intercepts the improved gravel road leading to the Wendover Range. No variation from the now disturbed route is anticipated. (See Figure 1.)

Once grading is completed, dump trucks and pups will begin to haul pit run gravel from a community pit and depositing the material along the access route, where it will be spread by the grader to the appropriate width and thickness. Once emptied of the gravel, the trucks will continue to the loading yard where they will be filled

with sand from an excavation dug by an available wheeled loader for placement of the dozer trap in the dune field (about 300 feet west of the loading yard). The loader will tram the sand from the trench to the trucks along the route of the conveyor and dozer track accessing the dune field from the loading yard. Once filled with sand the trucks will be covered and proceed to the market. Returning trucks will pickup gravel from the community pit and repeat the cycle. This cycle will continue until the access road is constructed, the dozer trap and conveyor are operational, and the loading / surge bin is in place. At that time, the wheeled loader will be replaced by the dozer that will be used during future production.

## **Transportation**

The quarried sand will be transported from the quarry site by dump truck (five axil) with pup (four axil). Each load will contain about 38 tons of sand. The trucks will enter the yard as shown on Figure 3 and circle clockwise under the loading bin. The load out will be operated by the driver and weighed by air ride suspension scales installed on all trucks and trailers to prevent over-weight loads. Thirteen to twenty-one trucks will be loaded each day.

## **Employees**

It is anticipated that three employees will be located at the quarry and loading yard. One will be a dozer operator. One will be a yard foreman to supervise the operation. And the third will maintain and fuel equipment, operate the grader and water truck for road maintenance and snow removal. In addition, a maximum of seven truck drivers will be required assuming each cycles three times each day. The construction crew is not expected to exceed six employees.

## **Operation Schedule**

It is scheduled that the quarry and yard will operate 260 days operation per year with maintenance and repairs taking an addition 4 days for a total of 264 days. This schedule is to produce 125,000 to 200,000 tons of sand annually. The quarry will operate 10 hours each working day between 7:00 am and 5:00 pm.

## **Mobil Equipment**

Equipment to be used during operation of the quarry are as follows;

Dozer	D6R lgp
Motor Grader	135H or 140H
Pickup trucks (two)	
Water truck	2,000 gallon
Dozer trap	
Covered conveyor	300 to 5,000 feet
Generator	250 kW
Dump trucks and pups (seven)	
Screen	Stationary, ¼ inch wire cloth

## IMPACT ASSESSMENT AND MITIGATION

### Total Area Disturbed

Permanent disturbance for the access road including turnouts, and the loading yard totals 26.4 acres. Only the 0.6 acres of the loading yard is newly disturbed land outside of the active dune field. In addition, the quarry will annually disturb from 6 to 18 acres depending on demand and sand thickness mined. Natural wind flow will rapidly return quarried areas to active sand dunes. Quarried areas of the dune field will be reseeded each fall as described in the Reclamation Plan described below.

### Vegetation

Appendix B is a vegetation survey done by Great Basin Biographers listing the now present vegetation. The quarry will only disturb the barren active and stable vegetated dune communities of the survey. The loading yard and new access road will displace *Sporobolus airoides* Remnant Desert Scrub vegetation. Vegetation communities are shown on Figure 4.

### Soils

Soils identified by the Natural Resource Conservation Service (Soil Conservation Service) are shown on Figure 4. Description of the soils included in Appendix C provided by the Natural Resource Conservation Service, Tooele Satellite Office and are taken from a report titled Soil Survey of Tooele Area, Utah on file in that office. The loading yard is located on Yenrab Fine Sand, and the quarry is on what are described as "dune lands". Analysis of these two soil types by the Utah State University, Soil Testing Laboratory are included in Appendix C.

### Cultural Resources

The access route has been cleared of cultural resource during the installation of the fiber optics line and a test mining period in early 1999. The results of these studies are published in the following reports;

- Christensen, D., 1990, *Air Force Fiber Optic Line*. U90-BL-158, Report on file, Utah State Historic Preservation Office, Salt Lake City.
- Newsome, Daniel K., 1999, *Class II Cultural Resource Inventory of a Proposed Sand Mining Location in Tooele County, Utah*, Report on File, Utah Historic Preservation Office, Salt Lake City.

Neither survey located cultural resources in the two corridors that will be followed to the project site.

Abajo Archeaology has completed a cultural resource survey of the loading site and the dune field from it's eastern margin 1500 feet westward into the dunes. Only one

small prehistoric sites were located in the NW¼ SE¼ Section 17. If this site is judged to be significant, it will be avoided during mining. Also, prehistoric resources were located in the dune field south of the initial mine area. The results of that survey will be forwarded by Abajo to the BLM Salt Lake District Office and will be placed in the Utah State, Division of State History files.

If other sites are encountered in the surveyed area, operations will stop in that area and the BLM will be notified. Additional surveys of cultural resources will be completed before mining of the dune field proceeds into areas not covered by these three surveys.

## **Air Quality and Fugitive Dust Control Plan**

Emissions from operating equipment and fugitive dust are possible air quality concerns related to this project. All equipment will be required to have approved, functioning emissions control devices.

The dust raised by the operation of the dozer on the dune field will be composed of fine sand grains (+90% between -80 mesh, +200 mesh, and <4% less than 200 mesh) similar to those blown by natural winds. These will settle to the dune surface as they now do when moved by the natural winds. Most PM-10 emissions will be raised along the 17.3 miles of unpaved road way used to access the loading yard.

The location of the Brown Sugar Mine is outside any PM-10 nonattainment areas. Prevailing winds should carry any fugitive dust to the south and not impact those nonattainment areas along the Wasatch Front. The operator plans to control fugitive dust by the following steps;

- ☐ All roads will be treated with magnesium chloride brine. Additional applications will be made as indicated by periodic monitoring.
- ☐ Roads will be watered during construction and as needed during operation.
- ☐ Conveyors will be covered.
- ☐ All trucks leaving the loading yard will be tarpped.
- ☐ Speed on the gravel access roads will be restricted to 30 mph.
- ☐ Dust control boots will be installed on the surge / loading bin at the intake and truck loading locations.
- ☐ Native grasses will be planted in areas within the loading yard, which are not covered with gravel. Graveled areas will be treated with MgCl<sub>2</sub> brine.
- ☐ A cattle guard will be placed where the access road enters the pavement to knock mud and dust from the haul trucks.

The operators will also incorporate any other dust control measures required by the Department of Air Quality during their review of this planned operation.

## Hydrology and Water Quality

There are no water courses within the dune field or about the loading site. Water courses crossed by the access road will be allowed to continue past the road by lowering the road surface to the present drainage grade during construction. Flat bottomed ditches, constructed as shown on the general road profile (Figure 5), will carry runoff from the road surface to these natural drainages when precipitation exceeds local absorption capacity. Ground and surface water will be protected for fuel spills by building containment basins about the fuel storage area as required by regulation. Used oil will be collected and transported off site for delivery to approved recycling contractors.

Site topography will pond storm runoff water in the southwest corner of the loading yard where it will be contained on site by a berm constructed and maintained in conjunction with the planned fire break within the perimeter fence. Impounded water will be allowed to seep into the ground or evaporate from this pond.

Ground water has been intercepted in a borehole about one mile east of the loading yard at an elevation of approximately 4195 feet (about 135 feet below ground level at the loading yard). The aquifer is described as sand and gravel located below a clay and gravel aquiclude. A report by Gates and Kruer (1981) summarizes ground water flow in the project area as follows;

*Water infiltrates into the upper parts of the alluvial fans and moves down the alluvial fan to the water table and then moves laterally in the alluvial fill and basin fill aquifers toward the saline mudflats, and mostly discharges by evapotranspiration in areas of phreatophytes along the margin of the flats.<sup>1</sup>*

Data specific to the alluvial fan and basin fill aquifers, or water quality about the project area is not available. If Mr Applegate and Mr Christiansen are granted the water right applied for and a well is drilled, such information will be gathered. Also, appropriate well head protection measures will be employed to prevent degradation of the aquifer.

Approval of this project will be obtained from the Utah State, Department of Environmental Quality, Division of Water Quality.

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<sup>1</sup>Gates, Joseph S. And Kruer, Stacie A., 1981, Hydrologic Reconnaissance of the Southern Great Salt Lake Desert and Summary of the Hydrology of West-Central Utah. State Of Utah, Department of Natural Resources, Technical Publication No. 71, page 17.

## **Visual Impact**

The project is not visible from any paved roadway. The area can be seen from the wilderness study area in the Cedar Mountains as outlined by BLM's inventory of the Utah wilderness potential. The project will not impact the study area or any future wilderness area beyond the impact of military activities on the nearby Dugway Proving Grounds and Wendover Bombing Range.

## **Sewage**

Sewage will be treated by a septic tank and drain field to be approved by the Tooele County Health Department.

## **Hazardous, Mine and Solid Wastes**

No hazardous or mine wastes will be generated by this operation other than the used oil addressed above. General solid waste will be transported for the site to a licensed land fill.

## **Public Safety**

Public safety will be protected by the following actions;

- ☐ The loading yard will be surrounded by a six foot chainlink fence with locking gates as shown on Figure 3. This will limit public access to the site.
- ☐ The dozer trap and conveyor will be plainly marked and the dozer trap will be surrounded by portable fence sections when the quarry is not in operation.
- ☐ Turnouts along the access route will allow for the safe passing of vehicles.
- ☐ Truck speed will be less than 30 mph along the unpaved access roads.
- ☐ The access road will be posted to indicate heavy truck traffic.
- ☐ All vehicles will be required to obey existing traffic laws and safety inspection regulation.

## **Fire Safety**

Fire safety will be addressed by the following items and actions;

- ☐ A ten foot wide fire break will be maintained inside the perimeter fence of the loading yard.
- ☐ The water truck will be equipped with a pump and high pressure hose for fighting fires. The water truck will be parked, filled with water during the fire season.
- ☐ 2,000 gallons of water will be maintained in the water storage tanks during the fire season. This will be plumbed through a pump into a stand pipe and hydrant to be located near the water storage tanks.
- ☐ Fire extinguishers will be carried in all trucks and mobile equipment. Fixed extinguishers will be located at the loading bin, fuel storage tank, maintenance

shed and office.

- ☐ The office will have radio communications to mobil equipment, trucks and an office in Tooele to facilitate rapid fire and emergency response.
- ☐ Fuel tanks will be located in such places and under such conditions as to conform to national fire codes (NFPA).

## **RECLAMATION PLAN**

Reclamation will proceed in two phases during and after operation of the Brown Sugar Mine. The first phase will be carried out in the dune field as mining progresses. The second will be the reclamation of the loading yard and the access road at the conclusion of operations.

In the Fall of each year seed at the rate and mixture listed below, will be broadcast and thinly covered on that portion of dune field quarried during the preceeding twelve months. It is anticipated that sand will continue to migrate from the west onto the previously quarried dune field and shift within the quarried area. This sand will effectively return the quarried area to its previous contour although somewhat lower in elevation. The plants will take root only on those areas of the dune field that are stable and retain enough moisture to allow germination of the seed. This process is identical to that now occurring on the active dunes.

Following the completion of the mining operation the loading yard and access road will be reclaimed. Also, mobil (dozer, water truck and motor grader) and stationary ( bin, conveyors, generator, office trailer, dozer trap) equipment will be removed and salvaged. The removal of fix improvements will take place as discribed in the following sections.

### **Top Soil Salvage and Replacement**

Six inches of top soil will be removed from the area of the utility pad, office pad and yard road during construction of the yard (an estimated 88 cubic yards). This top soil will be stored outside of the fenced perimeter of the yard in a low profile pile as shown on Figure 3. This pile will be seeded with the mixture and rate listed below to provide stability. Also, signs reading "Top Soil Storage, Do Not Disturb" will be posted on the pile. At the completion of mining activity, the pit run gravels and road base placed on the above areas will be ripped to a depth of two feet and the stored top soil spread on top of the gravels.

### **Access Road**

The road bed will be narrowed to eight feet by spreading the excess gravel to a depth not to exceed three inches along the route. The reclaimed portion of the route will be ripped to a depth of two feet and reseeded according the the following seeding plan.

### **Buried Utilities**

Buried electrical cable will be cut at a depth of two feet and left in place. Water distribution piping, septic tank and sewage line will be left in place. Ends of all piping will be removed to a depth of two feet and sealed to prevent animals from

accessing the interior of the pipes.

## Water Well

The water well will be sealed from the collar to a depth of twenty-five feet in the unconsolidated surface material or ten feet into consolidated material as required by regulation. The well will also be sealed twenty feet above and below any aquifers encountered. If the BLM wishes this well can be transferred to thier ownership following operations.

## Removal and Disposal of Fixed Improvments

Concrete used for fondations and pads will be broken up and removed to a licensed land fill. Also, the perimeter fence will be removed, with fabric and gates being salvaged or disposed of in a land fill. Estimates of the volume of concrete to be removed are as follows;

<input type="checkbox"/> Bin footings	48 cubic feet
<input type="checkbox"/> Trailer piers and tie downs	32 cubic feet
<input type="checkbox"/> Pad about drill hole and pressure tank	12 cubic feet
<input type="checkbox"/> Generator pad	16 cubic feet
<input type="checkbox"/> Dozer shed foundations	45 cubic feet
<input type="checkbox"/> Fence posts	<u>98 cubic feet</u>
<input type="checkbox"/> Total	251 cubic feet

## Seed Bed Preparation, Seeding Method and Seed Mixture

The entire loading yard and excess access road width will be disked and mulched with straw at a rate of two tons per acre to prepare the seed bed. The seed will be planted using a range drill at the mixture and rate listed below or at a mixture and rate recommended by the BLM at the time of closure. A target of 70% of the pre mining vegatative cover is set for post mining reclamation. This target is calculated for each vegetation community in the vegetation survey, Appendix B.

<input type="checkbox"/> Forage kochia	1 lb/acre
<input type="checkbox"/> Indian ricegrass	3 lbs/acre
<input type="checkbox"/> Fourwing saltbush	<u>1 lb/acre</u>
<input type="checkbox"/> Total	5 lbs acre

## Estimated Cost of Reclamation

The cost of final reclamation is estimated as follows;

### Removal of Equipment and Infrastructure

*Plan of Operations, Brown Sugar Mine*

Remove conveyors and dozer trap	5000 feet at \$3.50/ft	\$17,500
Remove office trailer		2,000
Remove fence and gates		2,000
Remove concret pads and foundations	215 ft <sup>3</sup> @ \$0.23/ ft <sup>3</sup>	100
Remove bin		3,000
Haul concrete and fencing to land fill	150 miles at \$2.00/mi	300
Water well closure	Including mobilization	7,000
Buried utilities closure		<u>3,000</u>
Subtotal		\$34,900
Grading and Soil Redistribution		
Rip and spread gravel from excess road width	12.9 acres @ \$350/acre	4,500
Rip pads and road in loading yard	0.6 acres @ \$350/acre	200
Redistribution of top soil at loading yard	100 yds @ \$0.90/yd	<u>100</u>
Subtotal		\$4,800
Revegetation		
Mulch, (yard and road)	13.5 acres, 2 tons/acre @ \$140/ton	\$3,800
Spread and disk mulch		1,000
Seed and seeding, (dunes, yard & road)	31.5 acres @ \$350 per acre	<u>4,700</u>
Subtotal		\$9,500
Other items		
Supervision	One month at \$4,000	\$4,000
Mobilization	Dozer, tractor with seed drill and disk at \$1,000 each	<u>2,000</u>
Subtotal		\$6,000
Contingency	10% of above	<u>\$5,500</u>
Total Reclamation Estimate		\$60,700

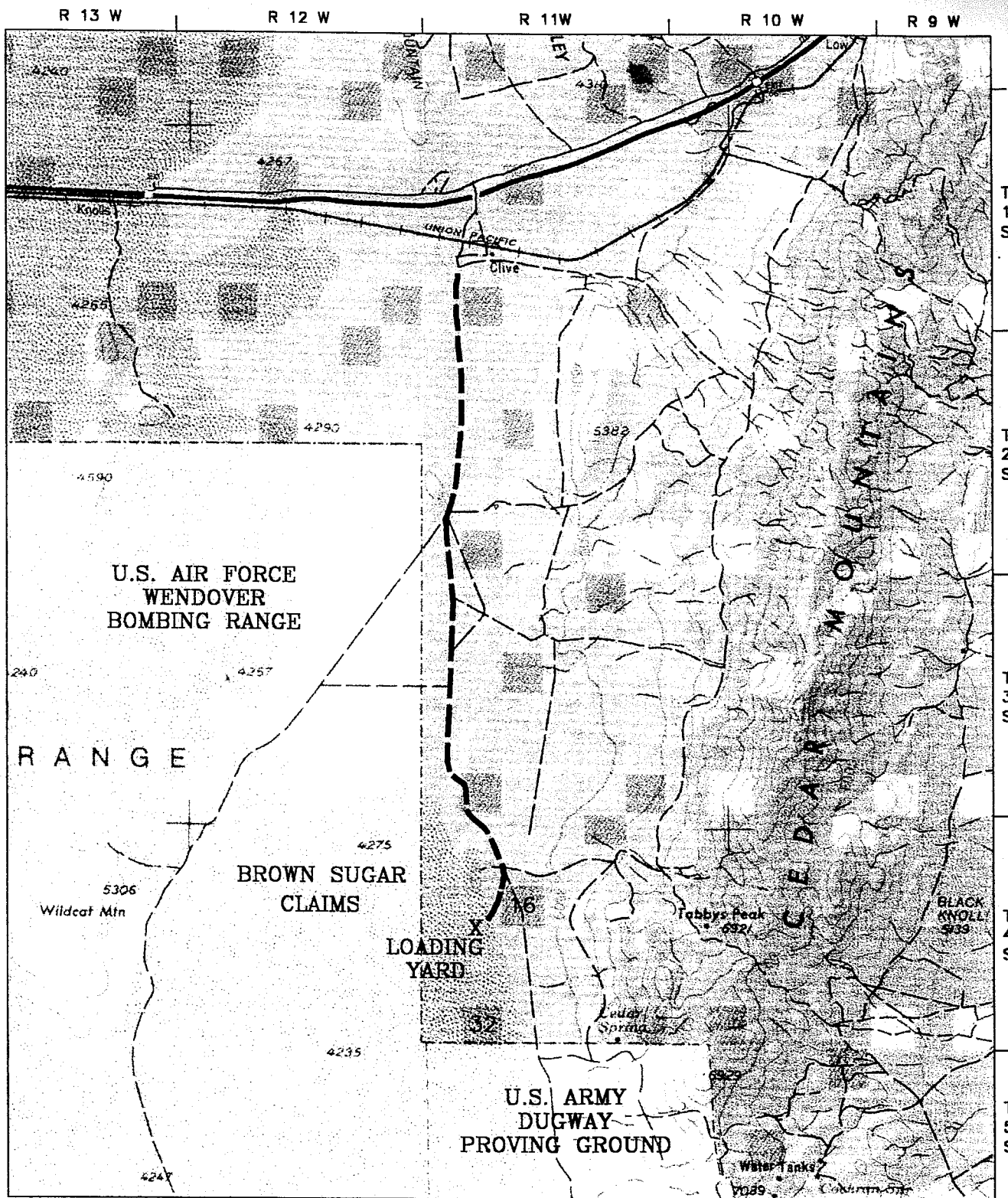
## Signature Requirement

I hereby state that the above is true and correct.

  
Gary Applegate

Date: 8/23, 1999

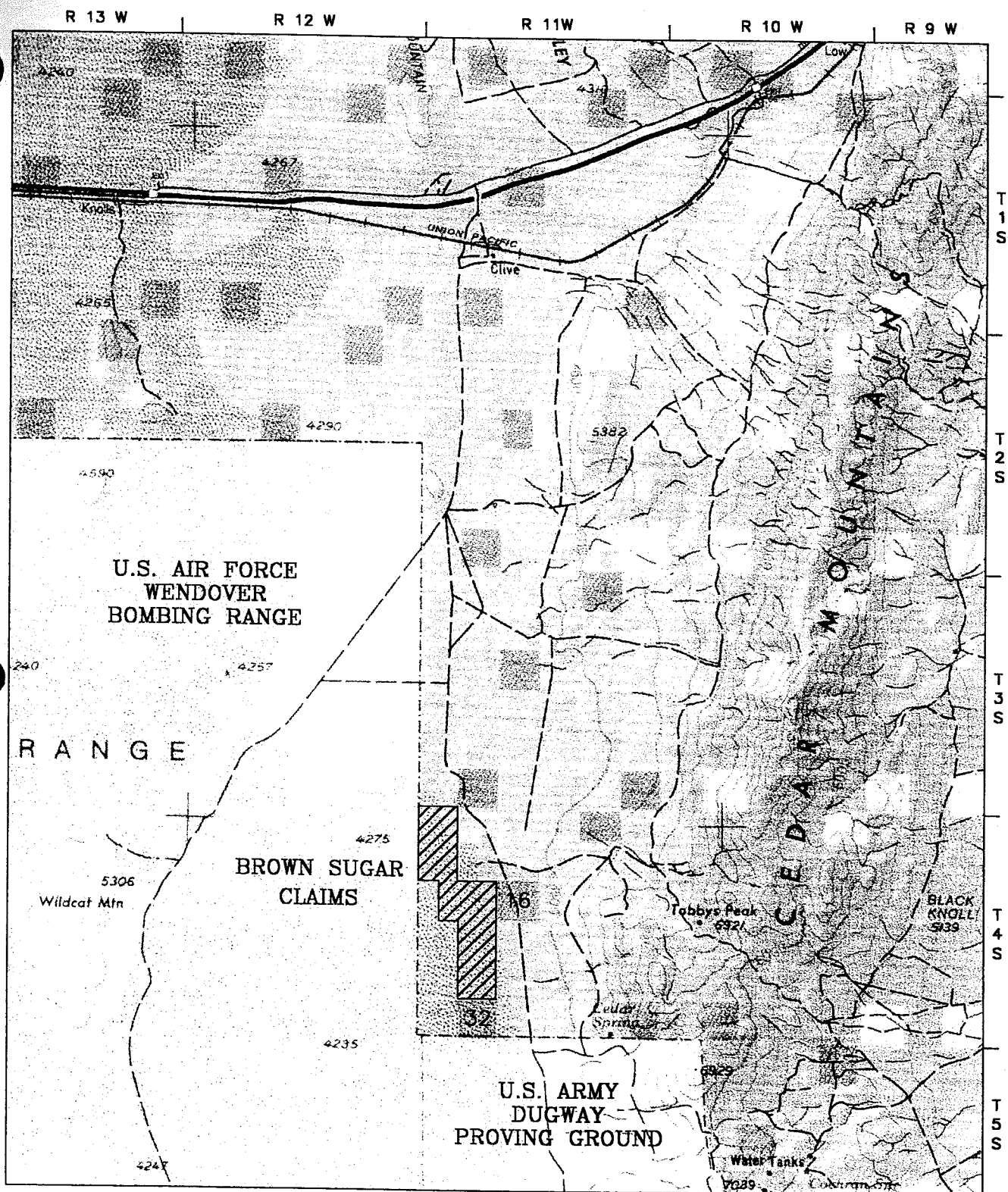
## **APPENDIX A, FIGURES**



Scale 1:250,000

— — — — — ACCESS ROAD

FIGURE 1  
BROWN SUGAR MINE  
ACCESS MAP



Scale 1:250,000



-  BLM ADMINISTRATION
-  UTAH STATE

FIGURE 2  
BROWN SUGAR MINE  
LAND STATUS

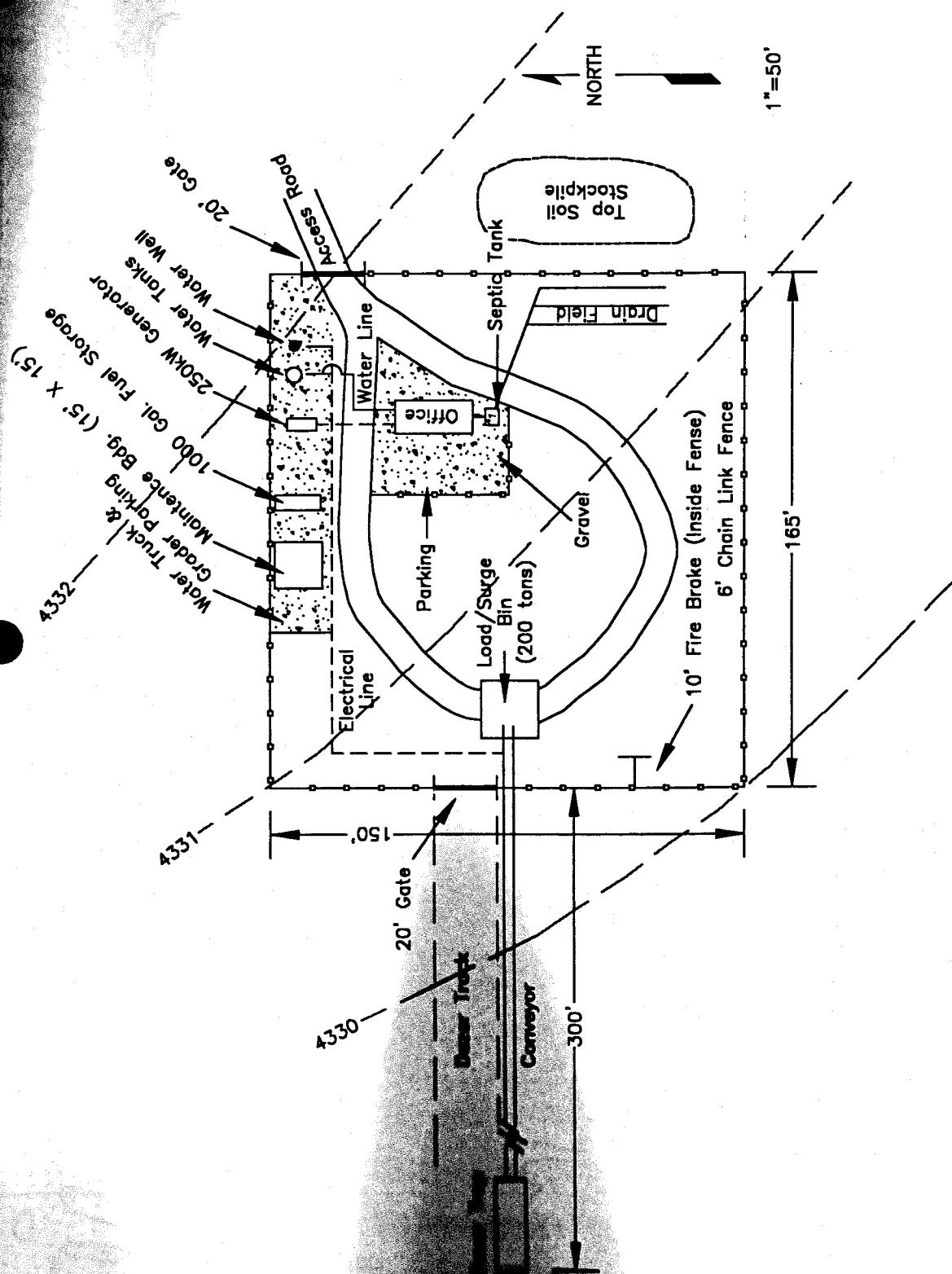
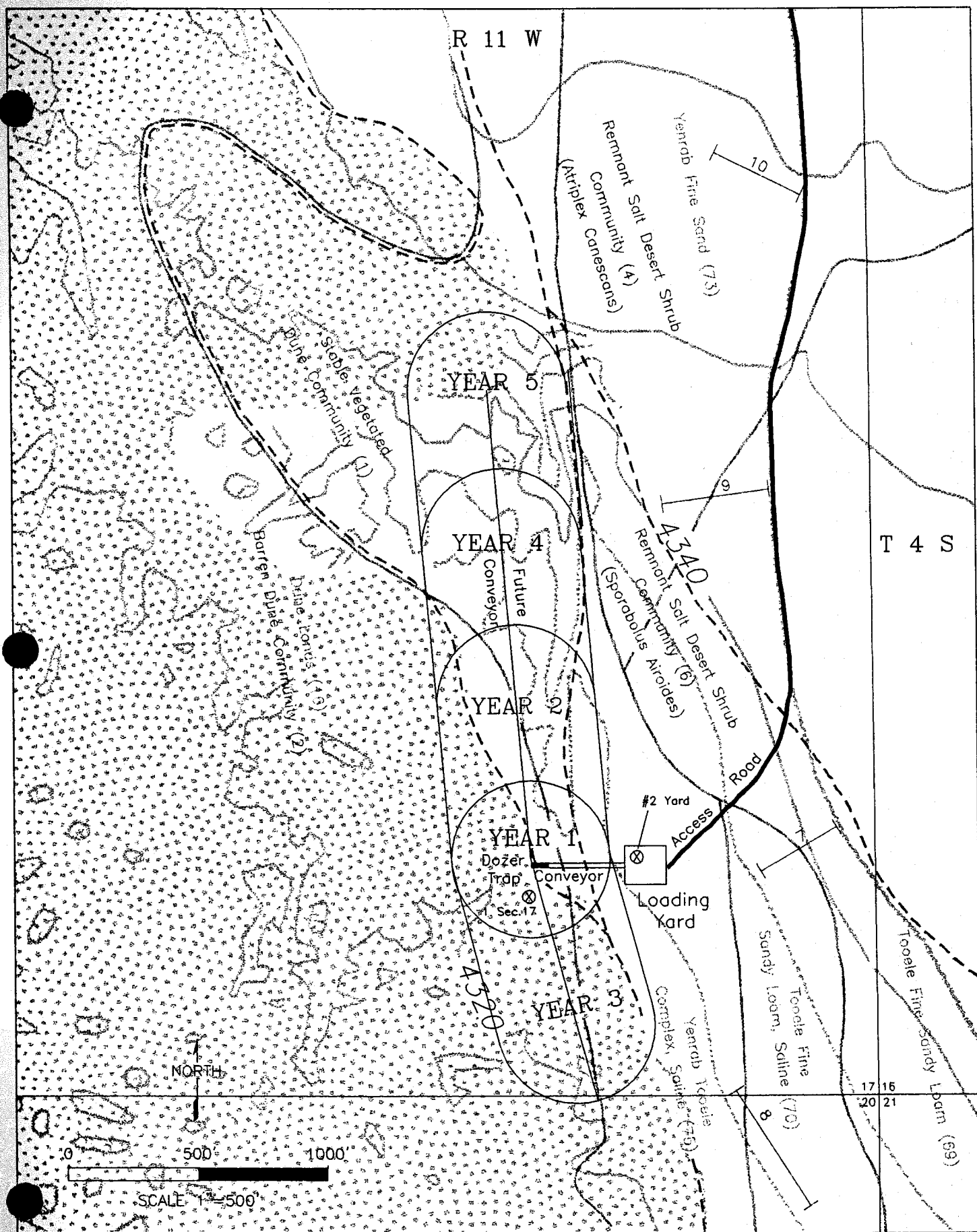


FIGURE 3  
BROWN SUGAR MINE  
LOADING YARD DETAIL



**FIGURE 4**  
**BROWN SUGAR MINE**  
**LAYOUT SOIL TYPES**  
**& VEGETATION COMMUNITIES**

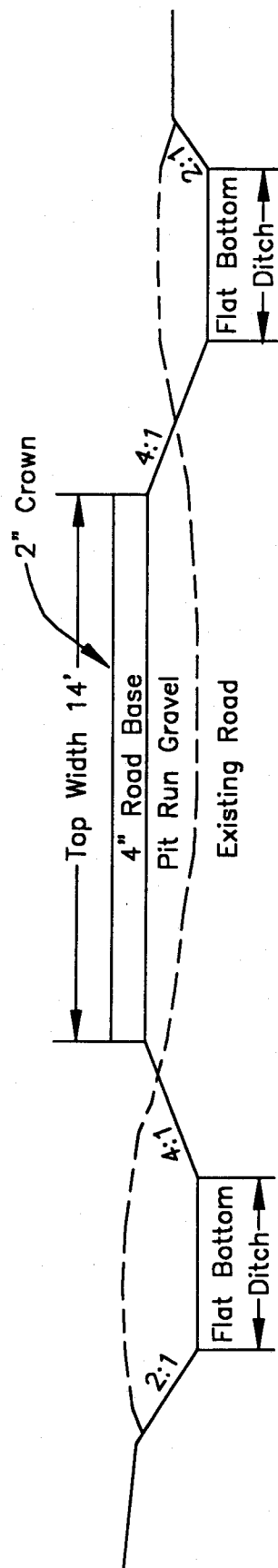


FIGURE 5  
BROWN SUGAR MINE  
TYPICAL ROAD PROFILE

## **APPENDIX B, VEGETATION SURVEY**

## **Field Report**

**Vegetation Survey for Wildcat Mountain Resources'  
Proposed Mine Site South of the Clive Exit on I-80**

**Client: Gary Applegate  
1275 North Main Street  
Tooele, Utah 84074**

**Requested by: James D. Rasmussen  
North American Exploration, Inc.  
492 North Main Street  
Kaysville, Utah 84037-1173  
(801) 544-3421**

**Survey conducted by: Alyce M. Hreha  
Great Basin Biogeographers  
Salt Lake City, Utah 84121  
(801) 944-2337**

**Survey Date: July 10, 1999**

## Methods:

Vegetation cover was sampled using the ocular estimation method described in Attachment 1. Ten to thirty plots were sampled in each major vegetation type. Transects were 50 meters long with ten (one meter square) plots located on alternate sides of the tape measure. Sample plots were located every 5 meters starting at 0 and ending at 45 meters. A total of 16 transects were sampled.

Percent vegetation, litter, rock/rock fragments and bare ground were tallied for each plot. The dominant native and invasive species contributing to percent cover in each sample plot were listed. Percent cover by cheat grass, the most abundant invasive species on the study site, and other invasive species were subtracted from the total vegetation cover.

## Survey Sites:

T4S R11W

SW1/4 of Section 5, South1/2 of Section 6  
and all of Sections 7, 17 and 20

USGS Quadrangle Maps: Aragonite SE, UT  
Aragonite SW, UT  
Wig Mountain NE, UT  
Wig Mountain NW, UT

## Results:

Vegetation types found at the proposed mine site include:

- (1) stable vegetated dune community
- (2) barren active dune community
- (3) salt desert shrub community
- (4) Atriplex canescens remnant community
- (5) Chrysothamnus viscidiflorus remnant community
- (6) Sporobolus airoides remnant community
- (7) Sarcobatus vermiculatus remnant community

(1) Stable Vegetated Dune Community

(Transects 1, 2 and 3)

<u>Ground Cover</u>	<u>Percent</u>
Vegetation	30.8
Cheat grass	1.2
Litter	11.0
Rock	0
Bare Ground	57.0
	<hr/> 100%

Revegetation Requirement (70% of Vegetation Percentage)= 21.6%

Dominant species: Chrysothamnus nauseosus (rubber rabbitbrush),  
Gutierrezia sarothrae (broom snakeweed), Oryzopsis hymenoides  
(indian ricegrass) Unknown species.

## (2) Barren Active Dune Community

(Transects 4, 5 and 6)

<u>Ground Cover</u>	<u>Percent</u>
Vegetation	8.5
Cheat grass	0
Litter	4.4
Rock	0
Bare Ground	87.1
	<hr/> 100%

Revegetation Requirement (70% of Vegetation Percentage)= 6.0%

Dominant species: Chrysothamnus nauseosus (rubber rabbitbrush), Oryzopsis hymenoides (indian ricegrass), Atriplex canescens (four-wing saltbush), Rumex venosus (dock).

### (3) Salt Desert Shrub (SDS) Community

(Transects 13, 14 and 16)

<u>Ground Cover</u>	<u>Percent</u>
Vegetation	18.0
Cheat grass	5.3
Other Invasives*	1.2
Litter	14.5
Rock	0
Bare Ground	61.0
	<hr/> 100%

Revegetation Requirement (70% of Vegetation Percentage)= 12.6%

Dominant species: Sporobolus airoides (alkali saccaton), Atriplex confertifolia (shadscale), Artemesia spinescens (budsage), other Atriplex species.

\* Halogeton glomerata and Lepidium perfoilatum

(4) Atriplex canescens Remnant SDS Community

(Transects 9 and 10)

<u>Ground Cover</u>	<u>Percent</u>
Vegetation	4.0
Cheat grass	25.3
Litter	29.0
Rock	0
Bare Ground	41.7
	<hr/> 100%

Revegetation Requirement (70% of Vegetation Percentage)= 2.8%

Dominant species: Atriplex canescens (four-wing saltbush), Bromus tectorum (cheatgrass), Oryzopsis hymenoides (indian ricegrass)

(5) Chrysothamnus viscidiflorus Remnant SDS Community

(Transect 11)

<u>Ground Cover</u>	<u>Percent</u>
Vegetation	15.0
Cheat grass	17.0
Litter	22.0
Rock	0
Bare Ground	46.0
	<hr/> 100%

Revegetation Requirement (70% of Vegetation Percentage)= 10.5%

Dominant species: Chrysothamnus viscidiflorus (sticky rabbitbrush),  
Bromus tectorum (cheatgrass), Oryzopsis hymenoides (indian  
ricegrass).

(6) Sporobolus airoides Remnant SDS Community

(Transects 7 and 8)

<u>Ground Cover</u>	<u>Percent</u>
Vegetation	30.0
Cheat grass	18.0
Litter	25.0
Rock	0
Bare Ground	27.0
	<hr/> 100%

Revegetation Requirement (70% of Vegetation Percentage)= 21.0%

Dominant species: Sporobolus airoides (alkali sacaton), Bromus tectorum (cheatgrass), Vulpia octoflora (six weeks fescue)

(7) Sarcobatus vermiculatus Remnant Community

(Transects 12 and 15)

<u>Ground Cover</u>	<u>Percent</u>
Vegetation	15.2
Cheat grass	29.3
Other Invasives*	8.0
Litter	27.5
Rock	0
Bare Ground	20.0
	<hr/> 100%

Revegetation Requirement (70% of Vegetation Percentage)= 10.6%

Dominant species: Sarcobatus vermiculatus (greasewood), Bromus tectorum (cheatgrass), Atriplex confertifloia (shadscale), Lepidium perfoliatum (clasping peppergrass)\*

**Conclusions:**

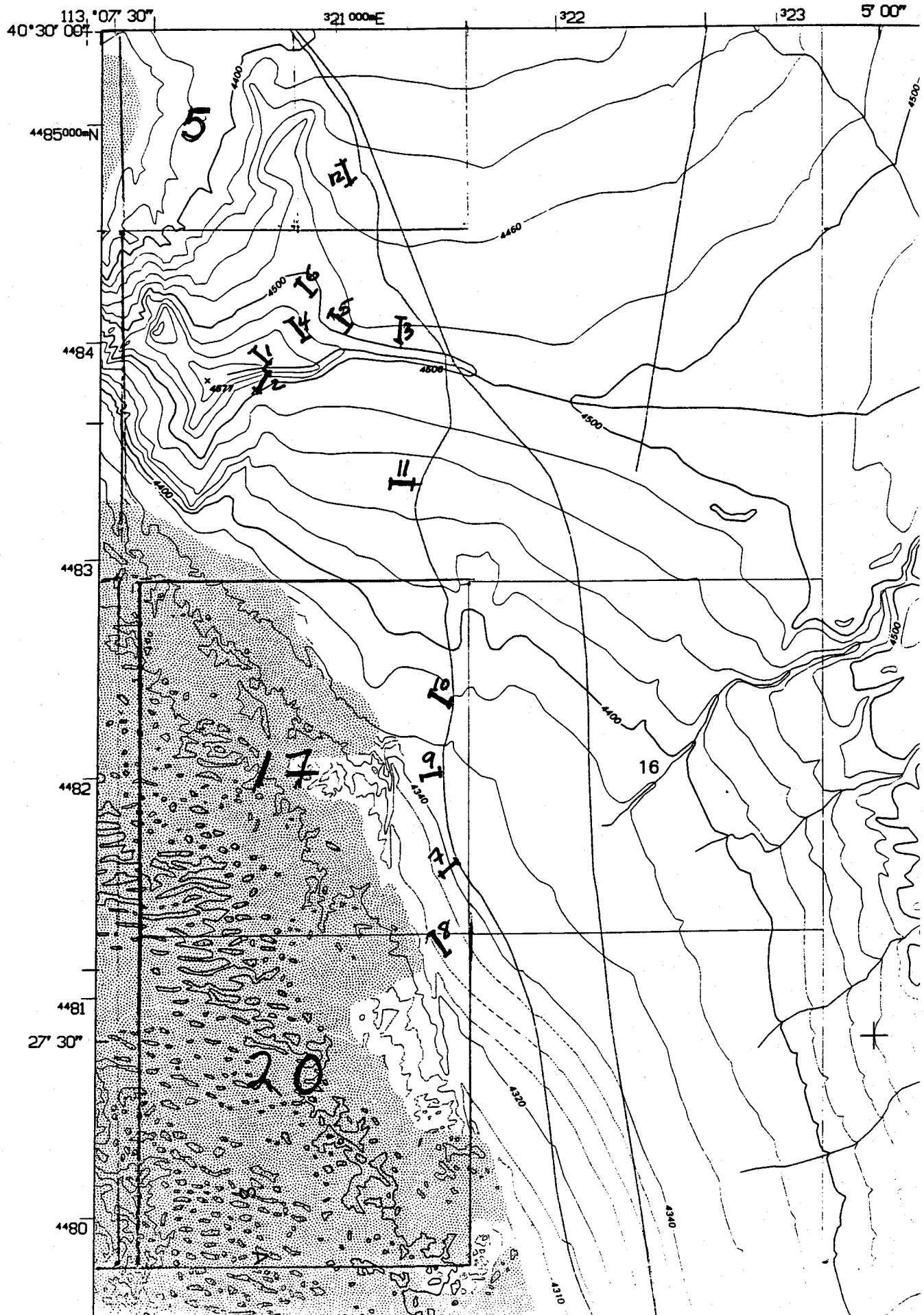
Most of the vegetation types at the study site are severely depauperate in representative species. The salt desert shrub type has been reduced to a few native shrubs with a high percentage of cheatgrass which ranged from 5-80% in the sample plots. The dune plant communities are the least disturbed.

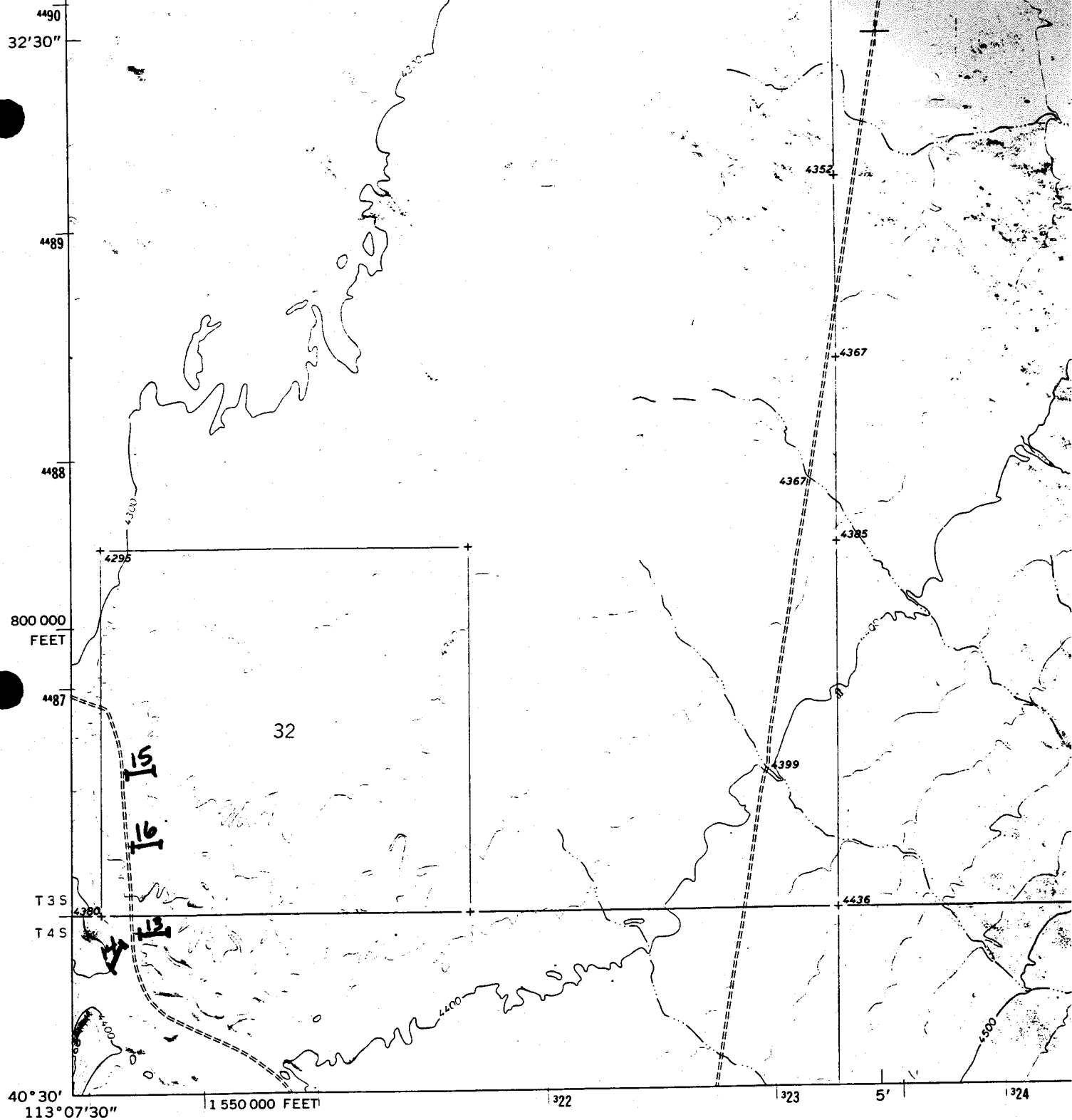
**References:**

- Cronquist, A., et al. 1972. Intermountain Flora. Vascular Plants of the Intermountain West, U.S.A. Volume One. New York Botanical Garden, New York. 270 p.
- Welsh, S., et al. 1993. A Utah Flora. Brigham Young University, Provo, Utah. 986 p.
- Whitson, T. et al. 1992. Weeds of the West. University of Wyoming, Cheyenne, Wyoming. 630 p.

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

Wig Mountain NE,  
UTAH





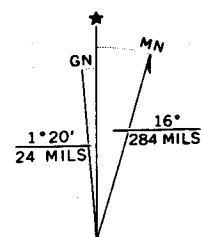
Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

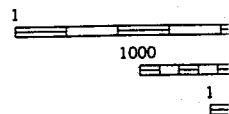
Topography by photogrammetric methods from aerial photographs taken 1972. Orthophotomosaic from aerial photographs taken 1972. Field checked 1973

Projection and 10,000-foot grid ticks: Utah coordinate system, central zone (Lambert conformal conic) 1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue. 1927 North American datum

Where omitted, land lines have not been established



UTM GRID AND 1973 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



*Aragonite SE, UTAH*

THIS  
FOR SALE BY U. S. G.  
A FOLDER

# Soil Test Report and Fertilizer Recommendations

## USU Analytical Labs

Utah State University  
Logan, Utah 84322-4830  
(435) 797-2217  
(435) 797-2117 (FAX)

Date Received: 8/2/99  
Date Completed: 8/12/99

Name: JAMES D RASMUSSEN  
Address:  
1519 N EAST HILLS DR  
BOUNTIFUL UT 84010

County: TOOELE CO

Lab Number: 99011055

Grower's Comments: Acres in Field:  
BASELINE ANALYSIS FOR MINE RECLAMATION PLAN.

Identification: 1 SEC 17

Crop to be Grown: Reclamation

Soil Test Results		Interpretations	Recommendations
Texture	Sand		
Lime	+	Normal	
pH	8.5	High	
Salinity - ECe mmhos/cm	0.2		
Phosphorus - P ppm	2.6		50-70 lbs P2O5/A
Potassium - K ppm	158		0 lbs K2O/A
Nitrate-Nitrogen - N ppm	1.1		40-60 lbs N/A
Zinc - Zn ppm	0.15	Very Low	10 lbs Zinc/A
Iron - Fe ppm	4.54	Marginal	
Copper - Cu ppm	0.12	Low	
Manganese - Mn ppm	1.12	Adequate	
Sulfate-Sulfur - S ppm	1.53	Probably deficient	10-20 lbs Sulfur/A
SAR			
Organic Matter %	0.17		

Notes

For further assistance, please see your County Agent --

# Soil Test Report

and

## Fertilizer Recommendations

### USU Analytical Labs

Utah State University  
Logan, Utah 84322-4830  
(435) 797-2217  
(435) 797-2117 (FAX)

Date Received: 8/2/99  
Date Completed: 8/12/99

Name: JAMES D RASMUSSEN  
Address: 1519 N EAST HILLS DR  
BOUNTIFUL UT 84010

County: TOOELE CO

Lab Number: 99011056

Grower's Comments: Acres in Field:  
BASELINE ANALYSIS FOR MINE RECLAMATION PLAN.

Identification: #2 YARD

Crop to be Grown: Reclamation

Soil Test Results			Interpretations	Recommendations
Texture		Sand		
Lime		++	Normal	
pH		7.8	Normal	
Salinity - ECe	mmhos/cm	0.4		
Phosphorus - P	ppm	8.0		20-40 lbs P2O5/A
Potassium - K	ppm	216		0 lbs K2O/A
Nitrate-Nitrogen - N	ppm	3.0		40-60 lbs N/A
Zinc - Zn	ppm	0.25	Very Low	10 lbs Zinc/A
Iron - Fe	ppm	1.88	Low	
Copper - Cu	ppm	0.23	Adequate	
Manganese - Mn	ppm	5.11	Adequate	
Sulfate-Sulfur - S	ppm	2.87	Probably deficient	10-20 lbs Sulfur/A
SAR				
Organic Matter	%	0.81		

Notes

For further assistance, please see your County Agent --